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Darwin, all of whom contributed matter of botanical or horticultural interest to the earlier volumes of the journal, which, though agricultural in name, has always been of interest and value to the botanist.

The double number of the *Botanische Zeitung* (Abtheilung I) for December 1 is devoted to Brunfels, a botanist of four hundred years ago.

*The Fern Bulletin* for January opens with a portrait of Professor Underwood.

## PALEONTOLOGY.

**Dean's "Palæontological Notes."**[1] — This elaborate memoir of upwards of forty pages, six plates, and eighteen text-figures, is one of the most important contributions to the literature of Devonian Arthrodires that has yet appeared in this country. It has for its twofold object a minute description of the skeletal structures in Mylostoma, Stenosteus, and Selenosteus (the last two being here made known for the first time), and a discussion of the characters and relationships of the whole group of Arthrodires, with the improvision of a new system for their arrangement.

Four of the quarto plates are admirably lithographed by the author from original specimens; the other two are from photographs. Not the least valuable and suggestive feature is the interspersion throughout the text of numerous diagrams showing the arrangement of plates in the cranial, dorsal, and ventral armor of different genera of Arthrodires. Restorations of this nature are not only useful for the graphic information they convey, but they afford an extremely convenient means of comparison. The interesting modifications displayed by Mylostoma and Dean's two new genera, especially as regards their dentition, constitute a welcome addition to our knowledge of this group. Owing to their poor preservation, the difficulty of deciphering the details which the author has painstakingly worked out and skillfully reconstructed must have been very great, and obviously none but an expert could have succeeded.

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[1] Dean, Bashford. Palæontological Notes. I, On Two New Arthrodires from the Cleveland Shale of Ohio; II, On the Characters of Mylostoma, Newberry; III, Further Notes on the Relationships of the Arthrognathi. *Mem. N. Y. Acad. Sci.*, vol. ii (1901), pt. iii.

Of more general interest, however, are the author's views as to the relationships of the so-called "Arthrognathi" (= Arthrodira + Anarthrodira, the latter comprising only the genera Macropetalichthys and Holopetalichthys). Excluding them from both Pisces and Ostracoderms, Dean assigns them the rank of an independent class, which he conjectures may have been descended from primitive forms like Lanarkia in the Silurian. The prime reason for removing Arthrodires from Pisces rests upon the interpretation of their jaw-elements, which Dean regards as merely dermal ossifications, showing "not the slightest evidence of their relation to endoskeletal or gill-arch jaws." There is, however, strong presumptive evidence that a cartilaginous mandibular arch was present, the distal portion of which ensheathed the lower dental plate ("gnathal," Dean), and the proximal portion, or suspensorium, was attached to the head-shield. How, for instance, is one able to conceive of the attenuated mandibles of Titanichthys, except as imbedded in tissues corresponding to the Meckelian cartilage?

The author advances some ingenious theories to explain the evolution of the articular joint between cranial and dorsal shields characteristic of Arthrodires, and, giving free rein to his imagination, speculates on how such a joint might have arisen in the head-shield of Macropetalichthys. A slight impediment exists, however, in the way of accepting his conclusions, for the reason that we cannot admit any of his premises. Dean assumes, and so, too, have Newberry, Cope, and Eastman before him, for that matter, that a valid basis of comparison exists between this enigmatical form and various specified genera, where the facts prove such is not the case; also that the arrangement of cranial plates and sensory canals in the genus under consideration is homologous with that pervading Arthrodires generally, which is an egregious error.

The fact of the matter is that all writers on Macropetalichthys have been misled by deceptive appearances, perhaps to some extent also by preconceived ideas, and its osteology has not yet been correctly interpreted. Eastman's and Dean's suggestion that there is a superficial system of investing plates arranged independently to a distinct substratum of bony elements is unsubstantiated, if not disproved; and still more improbable is the notion that the "head-shield" is made up of combined cranial and dorsal shields. The transverse septum peculiar to this genus is an internal structure situated a long distance in advance of the posterior cranial border, and recalling in a measure the inwardly directed processes on the inferior aspect of the postorbital in Dinichthys. There are in Macropetalichthys no movable ginglymoid joints, neither dorsal nor ventral armor so far as known, and apparently no ossified lower jaw. In short, this genus and the accompanying Asterosteus are as far removed from Arthrodires as are the Ostracoderms, and should perhaps be included in the same subclass with the latter. Their canal systems and cranial plates can be no more homologized with those of Arthrodires than with Stegocephalians, and the most we can affirm is that their arrangement is bilaterally symmetrical, and in a few respects similar or paralleled. Dean's text-figures 12 and 13 are objectionable, therefore, in so far as they depict merely fanciful conditions; and in Figs. 15 and 16 the overlap of the clavicular is shown, but the plate itself is omitted.

Apart from this parenthetical discussion, as it were, of extraneous genera, the author's generalizations respecting Arthrodires, his subdivision of them into several new families, and summary of their characters, reflect the advanced ideas of an investigator who has greatly enlightened us as to their structure and interrelationships.

C. R. E.

**Jurassic Fossils from Alaska.**[1] — In this paper Dr. Pompeckj has given a revision of all the known Jurassic fossils of Alaska and has described a number of new forms. According to Dr. Pompeckj the Lias is represented at Kialagvik, or Wrangell Bay, on the Peninsula of Alaska, as shown by the presence of *Amaltheus whiteavesi* White, *Lillia howelli* White, *L. kialagvikensis* White. This fauna was described by Dr. C. A. White as of Upper Jurassic or Lower Cretaceous age.

The Kelloway stage of the Middle Jurassic is represented at Katmaiskoj on the southeastern side of the Alaskan Peninsula, and on the northwestern side of the Kadiak Island. The former locality furnished the following fossils :

*Cadoceras wosnessenski* Grewingk, *C. grewingki* Pompeckj, *C. catostoma* Pompeckj, *Belemnitella, sp.* indet., *Aucella, sp.* indet., *Inoceramus, sp.* indet. The locality on Kadiak Island yielded the following fossils : *Phylloceras subobtusiforme* Pompeckj, *Cadoceras* conf. *wosnessenski* Grewingk, *C. grewingki* Pompeckj, *C. Schmidti* Pompeckj, *C. petelini* Pompeckj, C., *sp.* indet., *C. stenoloboide* Pompeckj. These fossils show a wide distribution of the sea during the Kelloway stage

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[1] Pompeckj, J. F. Jura-Fossilien aus Alaska, *Verhandl. Kais. Russ. Mineralog. Gesell. St. Petersbourg*, Ser. 2, Bd. xxxviii (1900), Nr. 1.